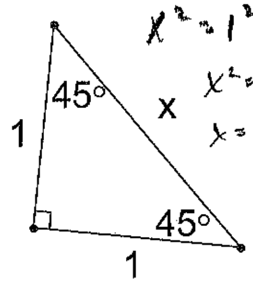
Mrs. Hayden

Name Key Date_______

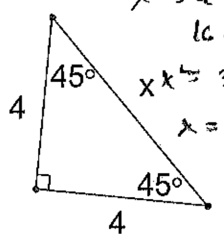
202 7.3 Special Right Triangles—Notes After Quiz

Use the Pythagorean Theorem to solve for x. Be sure to leave answers in Radical form! **You should notice a pattern here. If you see the pattern, you do not need to show all work.**

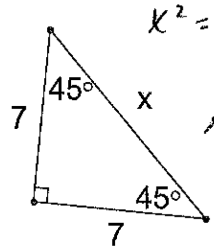
1. $\sqrt{2}$ 2. $4\sqrt{2}$ 3. $7\sqrt{2}$ 4. $2\sqrt{2}$



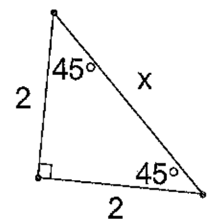
$x^2 = 1^2 + 1^2$
$x^2 = 2$
$x = \sqrt{2}$



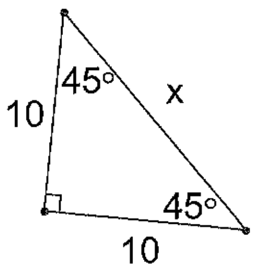
$x^2 = 4^2 + 4^2$
$16 + 16$
$x^2 = 32$
$x = 4\sqrt{2}$

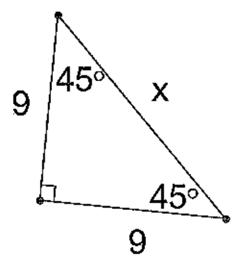


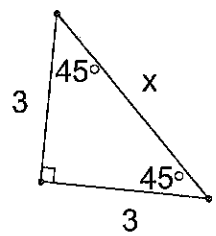
$x^2 = 7^2 + 7^2$
$49 + 49$
$x^2 = 98$
$49 \cdot 2$
$7\sqrt{2}$

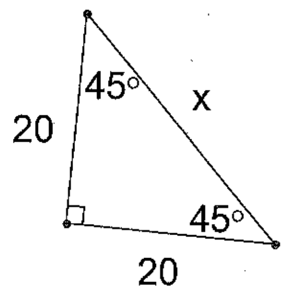


5. $10\sqrt{2}$ 6. $9\sqrt{2}$ 7. $3\sqrt{2}$ 8. $20\sqrt{2}$









Pattern

Theorem 7.6—In a 45°-45°-90° triangle, the length of the hypotenuse is $\sqrt{2}$ times the length of the leg.

45°	45°	90°
x	x	$x\sqrt{2}$

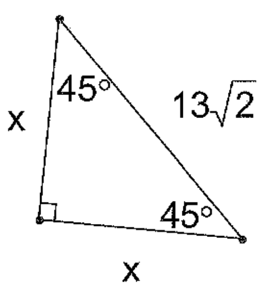
Different

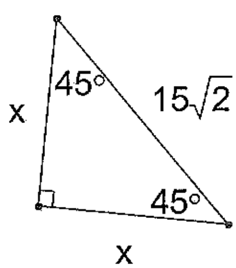
$14 \div \sqrt{2}$

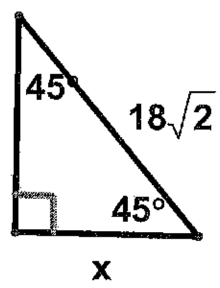
$\frac{14}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{14\sqrt{2}}{2}$

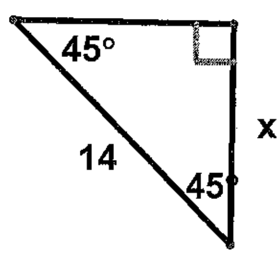
$= 7\sqrt{2}$

9. 13 10. 15 11. 18 *12. $7\sqrt{2}$







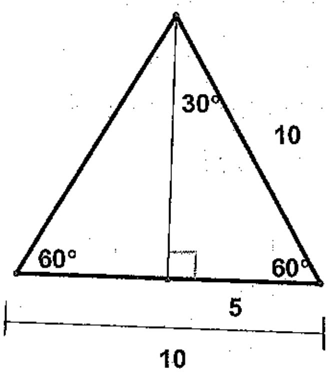


NEW Pattern

Mrs. Hayden

Take an equilateral triangle with a side of 10. Drop an altitude. This creates a 30°-60°-90° triangle. It also splits the opposite side into 5 and 5. Use Pythagorean theorem to find the height.

Height = $5\sqrt{3}$



$10^2 = 5^2 + h^2$

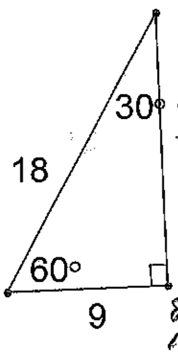
$100 = 25$

$75 = h^2$

$5\sqrt{3} = h$

Let's look at the 30°-60°-90° triangle that is formed and use Pythagorean Theorem to solve for the missing side.

13. $9\sqrt{3}$ 14. 4 15. 20 16. $3\sqrt{3}$



$18^2 = x^2 + 9^2$

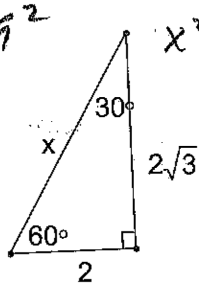
$324 = x^2 + 81$

-81

$243 = x^2$

$81 \quad 3$

$9 \quad 9$

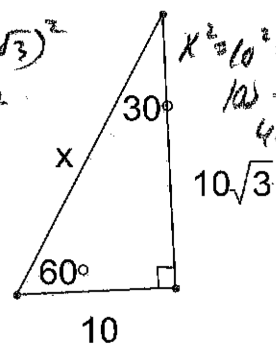


$x^2 = 2^2 + (2\sqrt{3})^2$

$4 + 12$

16

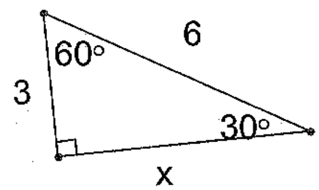
4



$x^2 = 10^2 + (10\sqrt{3})^2$

$100 + 300$

400



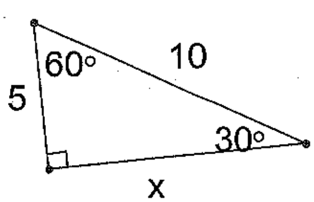
$6^2 = x^2 + 3^2$

$36 \quad 9$

$27 = x^2$

$9 \quad 3$

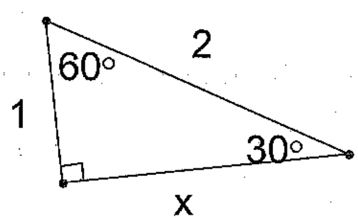
17. $5\sqrt{3}$ 18. $\sqrt{3}$



$100 = x^2 + 25$

$75 = x^2$

$5\sqrt{3} = x$



$4 = 1 + x^2$

$3 = x^2$

$\sqrt{3} = x$

Place the answers in the chart below, and look for a pattern.

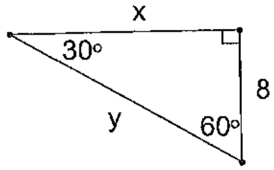
	30°	60°	90°
13.	9	$9\sqrt{3}$	18
14.	2	$2\sqrt{3}$	4
15.	10	$10\sqrt{3}$	20
16.	3	$3\sqrt{3}$	6
17.	5	$5\sqrt{3}$	10
18.	1	$\sqrt{3}$	2

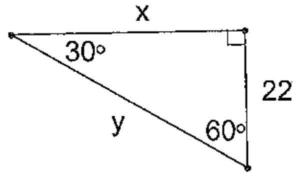
Different $\frac{18}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = 6\sqrt{3}$

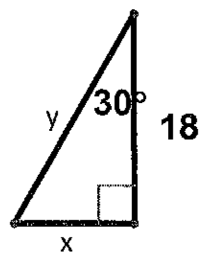
$x = 8\sqrt{3}$
19. $y = 16$

$x = 22\sqrt{3}$
20. $y = 44$

$x = 6\sqrt{3}$
*21. $y = 12\sqrt{3}$







Theorem 7.7—In a 30°-60°-90° triangle, the length of the hypotenuse is twice the length of the shorter leg, and the length of the longer leg is $\sqrt{3}$ times the length of the smaller leg.

30°	60°	90°
x	$x\sqrt{3}$	2x

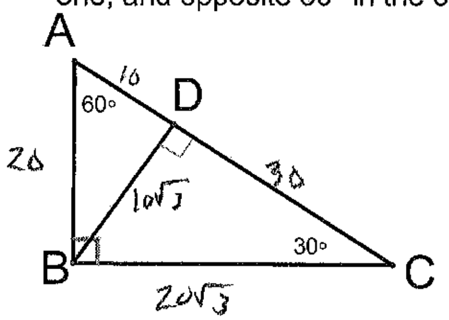
The problems with a * are more difficult because they don't fit the mold perfectly. They require you to divide by either $\sqrt{2}$ *or* $\sqrt{3}$. I will review that below.

#12 $\frac{14}{\sqrt{2}}$ You cannot leave it like this, so you must multiply by a "fancy" # 1. In other words, $\frac{\sqrt{2}}{\sqrt{2}}$.

$$\frac{14}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{14\sqrt{2}}{2} = 7\sqrt{2}$$

#21 $\frac{18}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{18\sqrt{3}}{3} = 6\sqrt{3}$

Example: BD = $10\sqrt{3}$. Find AB and BC. (Hint: BD is in two right triangles. It's opposite 60° in one, and opposite 30° in the other.)



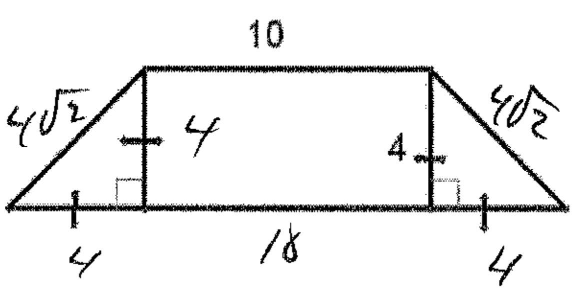
AB = 20

BC = $20\sqrt{3}$

30°	60°	90°
x	$x\sqrt{3}$	2x
10	$10\sqrt{3}$	20
$10\sqrt{3}$	30	$20\sqrt{3}$

$10\sqrt{3} \cdot \sqrt{3}$

A rectangle and 2 isosceles right triangles form the trapezoid below. Find its perimeter. (Round to the nearest tenth.)



$10 + 10 + 4 + 4 + 4\sqrt{2} + 4\sqrt{2}$

$28 + 8\sqrt{2}$

11.3 ≈ 39.3

12-22, 26

HW
p360-361 #s12-26